

SOA MADE EASY WITH SAP

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## SOA MADE EASY WITH SAP

Service-oriented architecture (SOA) is a blueprint for an adaptable, flexible, and open IT architecture for developing services-based, modular business solutions. SAP makes it easy to adopt SOA – enabling companies in diverse industries to quickly differentiate their businesses and optimize processes in their business networks. SAP enables businesses to adopt SOA at their own pace as part of their SAP solutions.

At the heart of SAP's open-standards approach to SOA is the concept of enterprise services – interfaces, which provide business processes or business process steps that can be used to compose business scenarios while ensuring business integrity and ease of reuse. SAP designs and implements enterprise services in such a way that they safeguard semantic harmonization and business relevance.

Using enterprise services, you can leverage SAP solutions in conjunction with partner solutions and homegrown solution landscapes to build new, flexible, and innovative solutions based on a consistent integration concept.

SAP and our partners can help your IT organization adopt SOA in a low-risk manner by delivering SOA-based technology, service-enabled applications, and prepackaged enterprise services grouped as business scenarios. SAP delivers SOA seamlessly via the service-enabled software (SAP Business Suite) and SOA-based, open technology platform (SAP NetWeaver). SAP consultants deliver services that complement SAP applications and accelerate SOA adoption.

We offer comprehensive methodology for design and development as well as operational SOA governance, modeling and implementation guidelines for service developers. Moreover, SAP's enterprise services follow the enhancement package concept, so you can add new functionality continuously, without extended upgrade cycles.

For more information about Service-Oriented Architecture made easy with SAP, see <https://www.sdn.sap.com/irj/sdn/soa>.

### Web Services and Enterprise Services

Enterprise services allow you to leverage SAP solutions to include a wide range of composite applications provided by customers and partners to build new, flexible, and innovative solutions. SAP publishes all enterprise services that support SAP Business Suite functionality at the Enterprise Services Workplace in the SAP Developer Network (SDN).

The following characteristics differentiate enterprise services from regular web services:

- **Business semantics:** Enterprise services are structured according to a harmonized enterprise model based on business objects, process components, and global data types (GDTs). They are defined using an outside-in approach: common business rules and know-how, rather than SAP-specific implementations, are the guideline for defining the business content of SAP applications.
- **Quality and stability:** Enterprise services safeguard a stable interface for future versions (backward compatibility). Their behaviour, prerequisites, dependencies of usage and configuration possibilities are well documented.
- **Standards:** Enterprise services are based on open standards. The interfaces are described according to WSDL. They are created by using global data types which are based on UN/CEFACT CCTS (Core Component Technical Specification). B2B enterprise services are defined in compliance with e-business standards, where applicable.

There are different application areas for enterprise services, for example application-to-application (A2A) and business-to-business (B2B) integration or user interfaces.

Enterprise services are identified at a business level that supports business processes. With the Enterprise Services Community (ESC), SAP actively engages customers and partners in the process of identifying and defining enterprise services. In this respect, SAP continuously analyzes all business processes from the perspective of the main key business drivers for SOA: business process automation, business process innovation, user efficiency, and deployment flexibility. As a result, SAP has defined and productized -- and continues to do so -- a comprehensive set of enterprise services to help customers, partners, and developers build flexible applications on top of the stable core of the SAP Business Suite. These services are published in the Enterprise Services Workplace.



## Semantics/Taxonomy

- **Business semantics consistency:** same understanding between service consumers and service providers
- **Technical** (Transport protocols, security standards, formats ...)

## Global Data Types

- Company-wide defined data types based on international standards
- Semantic building blocks for interfaces



Common modeling and implementation guidelines proven by SAP development are the basis for every (new) service development



The enterprise services repository is the central repository in which service interfaces and enterprise services are modeled and the corresponding metadata is managed throughout the life cycle



## Architectural Guidelines and Standards

## Enterprise Services Repository

SAP has developed an advanced meta model and governance process to define and model enterprise services. Key concept is the business object model. Each enterprise service is assigned to a business object, representing a well-defined business entity or document. Each business object is assigned to a process component. Process components are pieces of software covering a well-defined set of business tasks which belong logically together and are usually executed in the same department.

All identified services were modeled by SAP architects and developers in the Enterprise Services Repository (ES Repository), which is provided by SAP NetWeaver Process Integration or SAP NetWeaver Composition Environment since release 7.1.

Logically, an enterprise service is a service operation, derived from a standardized interface pattern, which contains operation names such as *create*, *read*, *update*, or *cancel*, and incorporates communicational patterns. It is described as a WSDL scheme in the ES Repository. The consuming application and the back-end systems communicate through messages that manage the input and output of the service operation data fields. If mediation capabilities like mappings, message orchestration and an extended receiver determination are needed, you might implement such kind of scenarios using SAP's SOA Middleware solution which is SAP NetWeaver Process Integration. Service operations can be grouped by service interfaces. In this document, service interfaces and service operations are often used as synonyms for particular enterprise services.

For example, the SAP ERP process component *Sales Order Processing* provides the enterprise service interface *Manage Sales Order In*, among others. From this interface, you can access the enterprise service operation *Create Sales Order*, which operates on the business object *Sales Order*.

The SOA governance process takes care that all enterprise services are defined according to the given rules. This safeguards consistency, standards compliance, harmonization of semantics and reuse across all SAP solutions. Based on the semantic definition, each enterprise service is subject to a harmonized service cut, an aligned naming, consistent documentation, a common service description and service orchestration. In result, enterprise services represent a "common language of business" at the required level of granularity.

With enterprise services, you can:

- Enable both process and system integration in A2A and B2B scenarios, which you can model, implement and execute with SAP NetWeaver Process Integration and SAP NetWeaver Business Process Management.
- Simplify and streamline user interaction through open consumption of innovative user interfaces, such as mobile devices and interactive forms, a.k.a. A2X scenarios.
- Leverage accelerated innovation through user and case-centric innovative processes (A2X) that can be implemented using SAP NetWeaver Composition Environment, while safeguarding higher process efficiency and reducing costs.

See the glossary of this document for a definition of the technical terms used above, or see the documents available at the Getting Started area of the *SOA Knowledge Center* at the bottom of the SOA home page in SDN.

## Enterprise Services Bundles

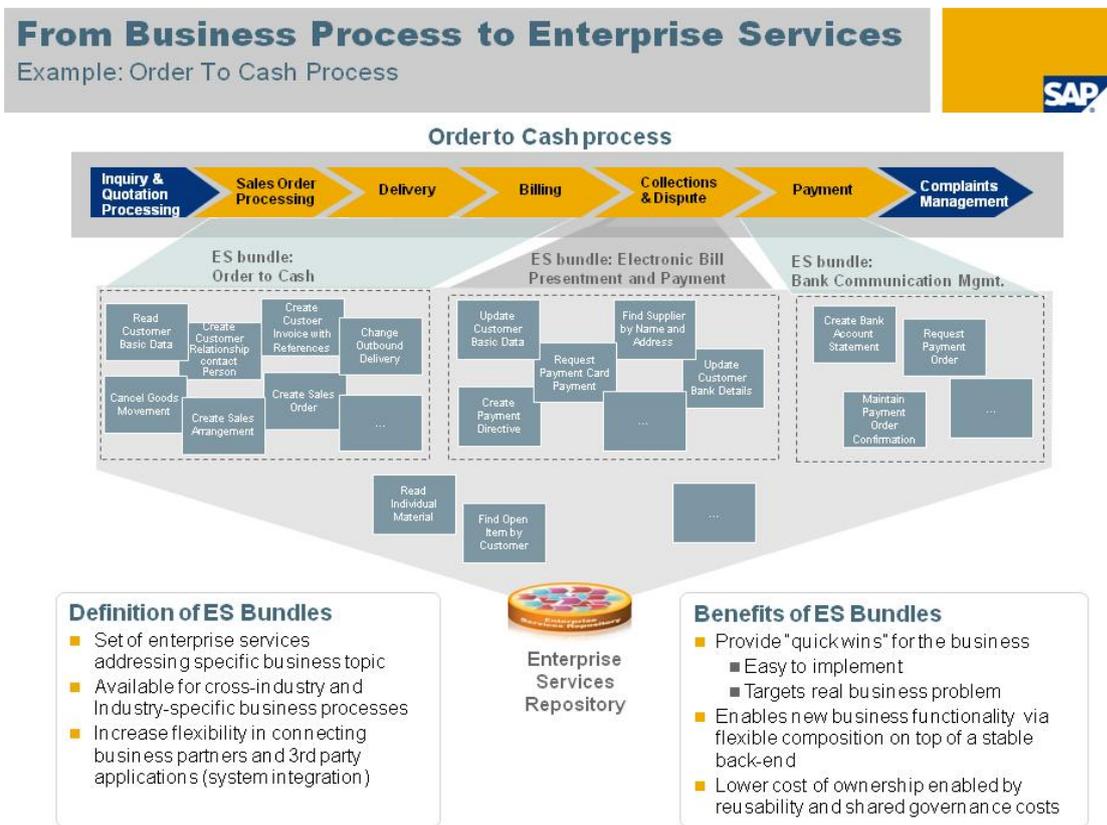
Enterprise Services (ES) bundles build the comprehensive portfolio of business scenario descriptions that are SOA-enabled by solutions and enterprise services shipped by SAP today. By reading ES bundles documentation, you will be able to understand the impact of SOA on your business processes even without profound knowledge about SAP solutions or technology.

Each ES bundle refers to a set of enterprise services that support a particular business process and are made available as part of the SAP Enhancement Packages for SAP Business Suite solutions.

ES Bundle documentation provides:

- exemplary use cases of how enterprise services help implement certain business process steps,
- documentation of how to extend and reconfigure processes in a business scenario,
- explanations of the relevant business scenario, processes, and roles involved and
- guidance about how to put the services to work.

ES bundles help design composite applications using SAP NetWeaver's enterprise services development and modeling tools.



## DISCOVERING SOA

SAP offers a wide range of opportunities to discover and evaluate enterprise services. You can choose them according to your skill level and role.

### Enterprise Services Workplace

The Enterprise Services Workplace (ES Workplace) provides partners, developers, and customers with straight-forward access to the latest versions of all enterprise services available for the SAP Business Suite in a hosted environment. It represents SAP's public Enterprise Services Repository, which provides streamline, continuous, and complete information about all enterprise services currently productized by SAP, from a business and technical perspective.

The ES Workplace is designed to take into account the different areas of expertise that users have and the information they require. The information requirements of both business process experts and solution architects are met, thereby closing any communication gaps that can exist between both groups. Since the enterprise services are placed in a business and technical context, both groups can now focus on the business process challenges and fully leverage the power of SOA made easy with SAP.

Discovering and evaluating enterprise services through the ES Workplace makes SOA tangible for you. With the ES Workplace, you can:

- Gain an insight into the wide range of enterprise services that SAP has to offer with its SAP Business Suite
- Check how a specific business scenario or solution component has been enabled by enterprise services from SAP
- Test enterprise service interfaces and operations in a hosted SOA landscape with demo data provided by SAP's demo environment IDES.

For more information about the rich content of the ES Workplace, see <http://www.sdn.sap.com/irj/sdn/esworkplace>.

## ES Workplace Allows Browsing for All Available Enterprise Services



### A public Enterprise Services Repository and SAP Systems – Accessible at SDN

- Where can I find out which enterprise services are provided by SAP?
- Where are they documented?
- Where can I test-drive them?



**With Enterprise Services Workplace (ES Workplace), SAP shares information on the available enterprise services with the community and offers access to SAP systems where you can test-drive enterprise services**

Exploring enterprise services involves the following phases:

### Find

The browsing environment of ES Workplace with technical documentation for all enterprise services delivered with the latest shipments of the SAP Business Suite is available to all registered SDN users. There are various ways of browsing the ES Workplace documentation, offering tailored information for multiple consumer roles:

- Multiple entry views starting at the business object or process component level, for those who are SOA savvy,
- The SAP Business Maps and integration scenario views enable you to start from a business perspective,
- ES Bundles, offering you sets of pre-packaged enterprise services that enable innovative business processes
- The Enterprise Services Wiki, offering step-by-step use case descriptions,
- Simple Sample Applications, which are hosted ready-to-run SOA demo apps and
- A powerful full-text search engine

You can access the ES Workplace browsing environment directly via <http://esworkplace.sap.com>

### Understand and Test

You can use the Web Services (WS) Navigator tool to search and test enterprise services right away. A direct link to this tool is <http://sr.esworkplace.sap.com/wsnavigator>. Plus, there are direct links to the WS Navigator from many service operation pages.

Partners and customers can test the hosted enterprise services free of charge. However, please note that login is required for testing in the SAP Business Suite back-end systems. You can apply for free ES Workplace testing systems access at <https://sdn.sap.com/irj/sdn/soareg>. Alternatively, you can call up the registration form and, once you've got your user ID, access the ES Workplace testing system landscape at <http://www.sdn.sap.com/irj/sdn/esworkplace>.

### Consume

You can find additional help for implementing enterprise services by having a look into the corresponding Simple Sample Applications for enterprise services consumption (Simple Sample Apps). Simple Sample Apps are available ready-to-run in the ES Workplace environment, together with technical documentation, coding, implementation models and demo data. SAP customers and partners can download and install these applications locally and test them against the back-end systems of the hosted ES Workplace testing environment.

Simple Sample Apps can be found at <http://esworkplace.sap.com> -> *Simple sample applications for enterprise services consumption*.

### **Enterprise Services Wiki**

SAP has set up the Enterprise Services Wiki, a collaborative environment based on Wiki technology, to publish the ES bundles catalog. The ES Wiki complements other SAP offerings, such as the Solution Maps or the ES Workplace, with detailed use cases for enterprise services, providing a business-oriented view on how SOA adds value to business processes.

The global community of developers, architects and business process experts can learn about how to put SOA to work and share tips and tricks related to the use (a.k.a. consumption) of enterprise services. If you have something to share, just type it in, since it's a real wiki. There are dedicated sections on each page for best practices, sample applications and success stories you can use.

The ES Wiki is accessible for everyone at <http://eswiki.sap.com>.

### **SAP Discovery System for SOA**

The SAP Discovery System is designed to help customers and partners map their paths to a successful adoption of SOA. With the SAP Discovery System, developers and enterprise architects have a clear risk-free first step in experimenting with SOA, enabling them to test-drive the simplicity and flexibility of composing new business processes using enterprise services in a standalone SOA environment.

According to the research firm IDC, the majority of companies that have adopted SOA prefer to approach SOA by first creating a pilot project or proof of concept. With SAP Discovery System, SAP provides the SOA environment in which you can take this first key step, gain experience with SOA and develop a pilot project or proof of concept to learn and understand the potential value to the organization.

The SAP Discovery System provides a complete, fully documented system with standard SAP software components for developing and delivering service-based applications, including all the interfaces, functionality, data, and guidance necessary to run a complete, end-to-end business scenario.

The SAP Discovery System version 4 is an evaluation environment that provides an opportunity to realize the joint value of SAP Business Process Platform and SAP BusinessObjects running on a single system.

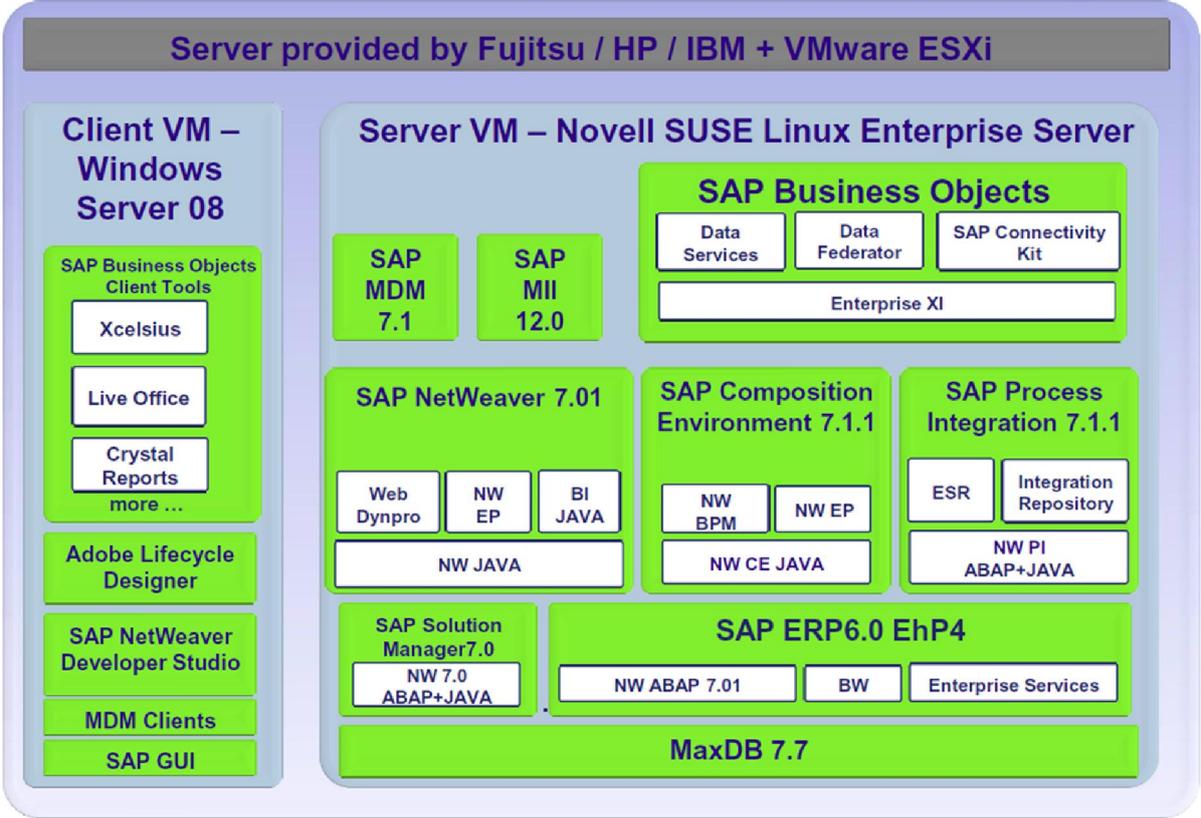
The SAP Business Process Platform, which is a part of the Discovery system, demonstrates how to accelerate business innovation and respond to changing business needs by designing reusable process components that make use of enterprise services.

The SAP BusinessObjects portfolio of tools and applications on the Discovery system were designed to help optimize information discovery and delivery; information management; and query, reporting, and analysis.

The SAP Discovery System can be ordered from the following partner vendors:

- from HP as a pre-installed image on the Intel Xeon-based HP ProLiant DL380 server at <http://www.hp.com/go/server/sap>,
- from Fujitsu Siemens Computers based on their PRIMERGY TX300 S3 Server at <http://www.fujitsu-siemens.com/sapdiscovery>.
- from IBM based on their System x3650 M2 server at <http://www.ibm.com/systems/x/solutions/infrastructure/erpcrm/sap/discoverysystem.html>

Note that as a partner, you need to have a valid test and demo license in place to run the applications and tools that are pre-installed on this system.



The SAP Discovery System addresses various levels of experience with SOA:

- For customers, the SAP Discovery System enables technical staff to start leveraging the latest software available from SAP today and gain an immediate hands-on learning experience with a typical SOA environment – at a low-cost entry point.
- For ISVs, the SAP Discovery System provides a full SAP ERP 6.0 application landscape, based on the last SAP Technology platform, against which they can test their own applications.
- For system integrators (SIs), the SAP Discovery System provides an additional element in their portfolios to help customers understand SOA and see the potential value of simplifying the learning and technology discovery process.
- For developers, solutions of the SAP technology offering are provided which are the key elements for enabling the innovations for the SAP Business Suite. With SAP Technology solutions, you can design composite applications and implement SOA, A2A and B2B processes end-to-end.

For more information about SAP Discovery System, see <http://www.sdn.sap.com/irj/sdn/discoverysystem>.

## Enterprise Services in Your SAP System

To discover enterprise services that are available in your SAP ERP 6.0 system, simply call transaction SOAMANAGER in the SAP GUI, open the tab *Application and Scenario Communication* and open the Single Service Administration. Enter a search pattern and click on “Go” to display the services corresponding to your selection criteria.

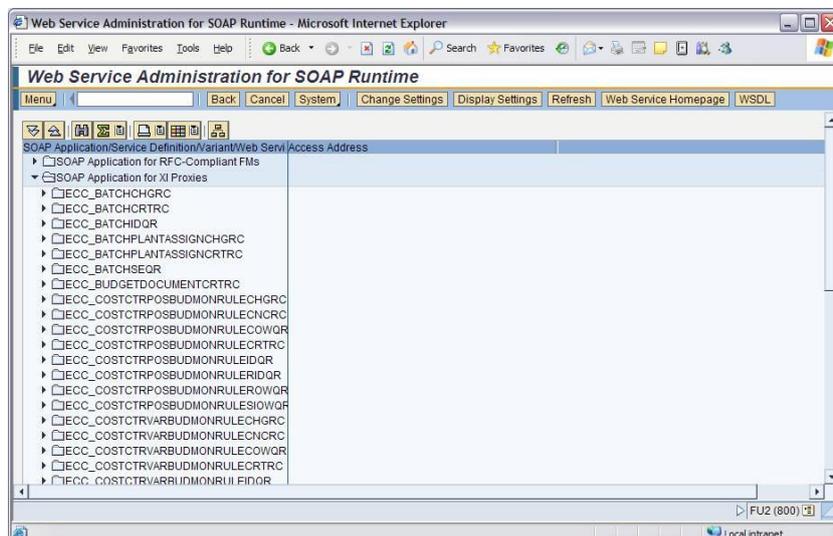
**Web Service Administration**

Search Design Time object for Web Service Configuration

Search by: Service Search Pattern: \* Field: External Name in System: GU2/800

| External Name  | Namespace                | Internal Name                 | Type    |
|--|--------------------------|-------------------------------|---------|
| FunctionalUnitERPMaterialRequirementByElementsQueryResponse_In     | http://sap.com/xi/EADFPS | /ISDFPS/DFPS_FUERPMATRYEQR    | Service |
| FunctionalUnitERPMaintenanceAssignmentUpdateRequestConfirmation_In | http://sap.com/xi/EADFPS | /ISDFPS/FUERPMINTASSGIMTUPDRC | Service |
| FunctionalUnitERPServiceOfferUpdateRequestConfirmation_In          | http://sap.com/xi/EADFPS | /ISDFPS/FUERPSRVASSGMNTUPDRC  | Service |
| FunctionalUnitERPSupportAssignmentByIDQueryResponse_In             | http://sap.com/xi/EADFPS | /ISDFPS/FUERPSUPASSGMNTBYIDQR | Service |
| FunctionalUnitERPSupplyAssignmentUpdateRequestConfirmation_In      | http://sap.com/xi/EADFPS | /ISDFPS/FUERPSUPASSGMNTUPDRC  | Service |

On systems based on SAP Basis Component 7.00 SP13 and lower use the transaction WSADMIN in the SAP GUI and expand the folder SOAP Application for XI Proxies. This displays the technical names of all enterprise services that are available in your SAP Business Suite system.



## IMPLEMENTING SOA

An ES bundle is not a pre-packaged installation or installable entity. You need to download and install the respective Enhancement Package or Support Package of the relevant SAP Business Suite application to make the enterprise services available in your system.

**Please note:** You may have to activate Business Functions to make certain enterprise services available in your system. ES Bundles cannot be activated. They are available in the software components you install on your system.

For further details on the SOA enablement of SAP's applications and on the consumption of enterprise services, please refer to the detailed Master Guides, available at the SAP Service Marketplace (e.g. at <http://service.sap.com/erp-ehp>) and the SAP Community Network (<http://www.sdn.sap.com/irj/sdn/soa>).

## GLOSSARY

### Process Component

Process components can be seen as the building blocks of each SOA solution. They are modular, context independent, reusable pieces of software that expose their functionalities as services. A process component contains at least one business object.

### Business Object

A business object is a logical object of significance to the business. It represents a class of entities with common characteristics and common behavior describing well defined business semantics. Business objects are used to model a business process. They therefore represent a specific view on business content.

### Web Service

A standardized service encapsulating the functions of an application in a way that other applications can locate and access the service. A Web service can be called directly in a peer-to-peer fashion.

### Global Data Type

An SAP-wide defined data type with meaning, structure, and values based on industry standards where available.

### Enterprise Service

Enterprise services are interfaces designed according to the following governance principles:

- Business semantics: Enterprise services are structured according to a harmonized enterprise model based on business objects, process components, and global data types (GDTs).
- Quality and stability: Enterprise services safeguard a stable interface for future versions (backward compatibility). Their behavior, prerequisites, dependencies of usage and configuration possibilities are well documented.
- Standards: Enterprise services are based on open standards. The interfaces are described according to WSDL. They are created by using global data types which are based on UN/CEFACT CCTS (Core Component Technical Specification).

### Service Operation

The smallest, separately-callable function within a service interface, described by a set of data types used as input, output, and fault parameters serving as a signature. A service operation is grouped by service interfaces.

### Service Interface

A named grouping of service operations, based on standardized interface patterns, such as *create*, *update*, or *cancel*

### Enterprise Services Bundle

An ES bundle is a piece of documentation that refers to a set of pre-packaged enterprise services, which support a particular business process and are made available as part of the SAP Enhancement Packages for SAP Business Suite solutions. ES bundle documentation provides exemplary use cases

of how enterprise services help implement certain business process steps, advice on how to extend and reconfigure processes in a business scenario, explanations of the relevant business scenario, processes, and roles involved, plus guidance about how to put the services to work.

### **Communicational Patterns**

Typical communicational patterns used by enterprise service operations are:

- *Request/confirmation*: means that messages are sent back and forth and that the state maintained by the service may change.
- *Query/response*: means that messages are sent back and forth but that the state maintained by the service does not change.
- *Notification*: means that a service sends a message that contains a notification of an event.
- *Information*: means that a service sends a message containing other information.

### **A2X, A2A, B2B**

Data exchange patterns for enterprise services:

- A2X: Application To X users, created for unforeseen extensions of the SAP software
- A2A: Application To Application, data exchange between two applications in one business process platform within the same enterprise
- B2B: Business To Business, data exchange between two business process platforms across enterprise boundaries

### **SAP NetWeaver Enterprise Services Repository**

SAP NetWeaver Enterprise Service Repository (ES Repository) is the central repository which contains the definition of all enterprise services and all models. Ideally, there is exactly one ES Repository in a system landscape. The ES Repository plays the role of the central business process integrator. The enterprise services, business objects and business processes are defined and modelled centrally.

### **WSDL**

WSDL is an XML-based description of Web services.

#### **WSDL from ES Repository**

WSDL from ES Repository is an XML-based description of Web services containing structural information. This WSDL does not contain the binding information of a service end-point.

#### **WSDL from Backend**

WSDL from Backend is an XML-based description of Web services containing binding information. Thus the WSDL contains all necessary information to actually call and consume an enterprise service

### **Message Type**

The reference to a data type used to define the data exchange between a service provider and its consumer. An operation comprises one or several message types such as requests, responses, and errors.

### **Technical Name**

The technical name is derived from the service operation name according to SAP naming conventions. It is the name for the service operation defined in ES Repository.

### **Composite Application**

A composite application is an application that uses data and functions provided as services by underlying applications, and combines these into user-centric processes and views, supported by its own business logic and specific user interface.

### **Services Registry**

The Services Registry is a registry for Web services. Located centrally within an SOA landscape, it contains entries for all services and service definitions in that landscape, with references to the services' relevant WSDL metadata and to the locations of the callable service endpoints. The registered services are classified using semantic-rich classification systems to enable browsing of services by classification.

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